

What is claimed is:

1 1. A method of assembling a semiconductor device
2 forming an encapsulant, comprising:

3 providing a substrate, having a plurality of
4 semiconductor devices respectively having
5 semiconductor chips electrically connected to a
6 predetermined encapsulation area on a surface of
7 the substrate;

8 filling an encapsulant overlying the predetermined
9 encapsulation area using stencil printing, and
10 sweeping excess encapsulant over the
11 predetermined encapsulation area at a first air
12 pressure less than approximately 1 atm;

13 sweeping excess encapsulant from the predetermined
14 encapsulation area over the encapsulant overlying
15 the predetermined encapsulation area using
16 stencil printing at a second air pressure
17 exceeding the first air pressure; and

18 hardening the encapsulant at a third air pressure
19 exceeding approximately 1atm.

1 2. The method as claimed in claim 1, wherein each
2 semiconductor chip electrically connects to the substrate
3 using flip chip technology, using a plurality of conductive
4 bumps, arranged at a predetermined pitch among each other
5 between each semiconductor chip and the substrate.

1 3. The method as claimed in claim 1, wherein the
2 encapsulant overlying the predetermined encapsulation area
3 completely covers the semiconductor chips.

1 4. The method as claimed in claim 2, wherein the
2 encapsulant overlying the predetermined encapsulation area
3 further fills the areas between each semiconductor chip and
4 the substrate, and among the conductive bumps.

1 5. The method as claimed in claim 2, wherein the
2 thickness of the encapsulant overlying the predetermined
3 encapsulation area is as large as the sum of the thickness
4 of the conductive bump and that of the semiconductor chip or
5 exceeding.

1 6. The method as claimed in claim 1, wherein the first
2 air pressure is about 0.1 to 10torr.

1 7. The method as claimed in claim 1, wherein the third
2 air pressure is as large as 30 kgf/cm^2 or below.

1 8. The method as claimed in claim 1, wherein the third
2 air pressure is about 3 kgf/cm^2 to 15 kgf/cm^2 .

1 9. The method as claimed in claim 1, wherein the third
2 air pressure is provided by dry air, nitrogen, or inert
3 gases.

1 10. A method of assembling a semiconductor device,
2 comprising:

3 providing a substrate and a plurality of semiconductor
4 chips, the substrate having a predetermined

5 encapsulation area, and a plurality of packaging
6 units, on a surface;
7 respectively attaching the semiconductor chips to the
8 packaging units, the semiconductor chips
9 respectively electrically connecting to the
10 substrate;
11 filling an encapsulant overlying the predetermined
12 encapsulation area using stencil printing,
13 sweeping an excess of the encapsulant over the
14 predetermined encapsulation area at a first air
15 pressure below approximately 1 atm;
16 sweeping excess encapsulant from the predetermined
17 encapsulation area over the encapsulant overlying
18 the predetermined encapsulation area using
19 stencil printing at a second air pressure above
20 the first air pressure;
21 performing a first hardening step to harden the
22 encapsulant at a third air pressure above
23 approximately 1 atm; and
24 dividing the substrate into a plurality of
25 semiconductor devices according to the packaging
26 units.

1 11. The method as claimed in claim 10, wherein each
2 semiconductor chip electrically connects to the substrate
3 using flip chip technology, using a plurality of conductive
4 bumps, arranged at a predetermined pitch among each other
5 between each semiconductor chip and the substrate.

1 12. The method as claimed in claim 10, wherein the
2 encapsulant overlying the predetermined encapsulation area
3 completely covers the semiconductor chips.

1 13. The method as claimed in claim 11, wherein the
2 encapsulant overlying the predetermined encapsulation area
3 further fills the area between each semiconductor chip and
4 the substrate, and among the conductive bumps.

1 14. The method as claimed in claim 11, wherein the
2 thickness of the encapsulant overlying the predetermined
3 encapsulation area is as large as the sum of the thickness
4 of the conductive bump and that of the semiconductor chip or
5 above.

1 15. The method as claimed in claim 10, wherein the
2 first air pressure is about 0.1 torr to 10 torrs.

1 16. The method as claimed in claim 10, wherein the
2 third air pressure is as large as 30 kgf/cm^2 or below.

1 17. The method as claimed in claim 10, wherein the
2 third air pressure is about 3 kgf/cm^2 to 15 kgf/cm^2 .

1 18. The method as claimed in claim 10, wherein the
2 third air pressure is provided by dry air, nitrogen, or
3 inert gases.

1 19. The method as claimed in claim 10, further
2 comprising performing a second hardening step to completely
3 harden the encapsulant.

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1 20. The method as claimed in claim 10, further
2 comprising forming a plurality of leads or connecting balls
3 overlying the semiconductor devices.